of modern climatologists. A uniform standard of time is used, namely, that of eight hours east of Greenwich, which is, we believe, also the time shown by the time ball at the observatory for the use of the shipping. 8 a. m. at Washington is simultaneous with 9 p. m. of the same date at Manila. The record for a single month, at all 44 stations, occupies about 93 or 94 pages, and the twelve months, without an annual summary, make up an imposing volume of 1128 pages, from which one may see that the pages are not crowded with figures. This suggests the remark that considerable extravagance with regard to space and pages is shown in nearly all tabular matter that has hitherto been published under American auspices. We notice that in corresponding publications by European nations twice as much material is crowded into a single quarto page without destroying, but in fact increasing, the convenience with which one uses the data. Still it must be confest that very few nations have made their original daily records so accessible to climatologists as these of the Philippines, and we believe the result will be greatly to the advantage of these islands, since the superior attractiveness of their climates can now be more fully appreciated.

With this volume we receive also a copy of the Far Eastern Review, Vol. II, No. 13, for May, 1906, which is especially devoted to the Moro Province and the island of Mindanao. We owe this to the kindness of our former colleague, now Capt. John P. Finley, U. S. A., Governor of the District of Zamboanga and founder of the Moro Exchange at that place. As many of our readers are teachers of geography and climatology and will wish to do justice to these distant American possessions, we must refer them to this Far Eastern Review for details as to the climate and country. Brentano's (incorp.) is the American agency.

LUNAR RAINBOW AT TAMPA, FLA.

By J. S. HAZEN, Local Forecaster. Dated October 30, 1906.

A peculiar and interesting meteorological condition prevailed over this vicinity during the passage of a West Indian storm over the Gulf on October 1, 2, and 3. On October 1, from 8:30 to 10:30 p. m., fully eight-tenths of the sky was covered by a striated form of cirro-cumulus clouds, making a uniform banded appearance which was very striking. The appearance was much like the segments of a gigantic orange over portions of the sky. The bands were apparently about 10° in width at the zenith, decreasing somewhat toward the horizon, and were well defined and distinct from the intermediate spaces, which were apparently clear of clouds and of about the same width.

About 9 p. m. a brilliant and perfect lunar corona was observed, the prismatic colors being especially well defined, and running from purple to pale lavender. There was also a double row of concentric rings showing prismatic colors, outside the first corona. On the 2d and 3d of October lunar rainbows were observed, that on the 2d being especially brilliant and an object of much interest to many people in Tampa who saw it. A slight thunderstorm past west of the station early in the evening, and rapidly moving, massive cumulus clouds were drifting across the sky near the western horizon during the time the bow was noted.

The bow was a perfect arch, and showed all prismatic colors with remarkable distinctness. It reached at one time high above a large mass of cumulus clouds, showing with equal distinctness against the back ground of dark cumulus clouds and the apparently clear sky above the cloud. Stars could be seen thru the bow with brilliancy very little diminished, if any. Both phenomena were observed by many in this city. It is understood that a lunar rainbow was observed in Pensacola also about this time.

The lunar rainbow is such an unusual occurrence that the writer would be pleased to have editorial comment pertaining to meteorological conditions necessary for the display of such phenomena, and whether or not the passage of a West Indian storm would bring about meteorological conditions likely to result in such phenomena.

It occurs to the writer that certain extensive movements of the upper air must be necessary to result in such a condition as was observed here on the dates mentioned.

EDITORIAL.—On the evening of October 1 the above-mentioned storm center was two or three hundred miles northwest of Tampa, and whatever the local winds may have been at that place the general drift of the atmosphere above it seems to have been from the south and east. This upper current was not necessarily at any great elevation, and below it was the usual layer, a few thousand feet in thickness, of relatively quiet air. Under these conditions a series of atmospheric waves, each of them many miles in length and possibly a mile or two in breadth, is usually formed.[1] The upper portion, or crest, of each billow becomes visible by a little cloudy condensation, while the lower portion is formed of relatively clear air. These crests and troughs must have extended eastward and westward in this case, or perhaps northeastward and southwestward, over Tampa, in parallel lines toward the distant horizon, and the observer, looking upward, should have seen them by perspective tapering toward the two opposite vanishing points, and covering the sky with markings analogous to the gores of a gigantic balloon. The width of each gore, or band, is stated by Mr. Hazen to have been about ten degrees at the zenith, and if the clouds were five or six thousand feet above him, this would correspond to about one thousand feet in linear distance.[2] If we knew the exact height and width of the billows, we could compute approximately the velocity of the wind at that elevation.

A corona, or glory, is formed by light shining thru a layer of small particles, such as dust, or fog, or crystals (spiculæ) of ice. If the observer had given the diameters of some of the rings of color composing the corona, something could have been inferred about the size and shape of these particles; but the fact that he does not mention the size, nor state whether the purple rings were inside or outside of the lavender rings makes it difficult to decide whether we have to do with a corona or a halo.

On the 2d and 3d of October lunar rainbows were observed. These require the presence of drops of water of appreciable size, and are not especially rare, but it is interesting to notice that they occurred apparently long after the passage of a slight thunderstorm on the 2d, and again quite independently of any rain on the 3d. The drops needed to form the lunar rainbows must, therefore, have been thinly scattered thru the clear air and may have evaporated in falling to the ground.

The passage of a West Indian hurricane is believed not to be necessary as preliminary to the appearance of such rainbows and coronas, and we hope that several of the observers in Florida will give us statistical studies of the relations between storms and halos, coronas and rainbows, based upon the records of their respective stations.—*C. A.*

THE ORIGIN OF OUR COLD WAVES.

It has for a long time been desirable to obtain observations and daily maps that would throw light upon the rival hypotheses as to the origin and nature, or the mechanics, of the areas of high pressure and cold, dry air that descend from the northwest, north, and sometimes the northeast upon the United States.

According to one, these are due to upper westerly winds blowing over the Rocky Mountains toward areas of low pressure. The air becomes clear and dry as it descends the eastern

[1] See Helmholtz on "Atmospheric Motions," translated in "Mechanics of the Earth's Atmosphere."

[2] One degree is 1/57.3 part of the radius.